Answers to questions about Certification Programs

"Remember, the most important element is documentation to demonstrate that established standards have been met."

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Certification is a written statement with a signature or seal from a competent authority to attest that a person has met an established standard. In industry, these are job standards, and they have a direct bearing upon actual job performance. It is training's purpose to help a person meet or perform to that standard. *The standard against which performance is measured is the key.* For example, a nuclear plant reactor operator may be required to adjust control rods to maintain plant temperature. The standard for the reactor operator may read, "the reactor operator must be able to adjust the reactor rods to raise the reactor plant coolant temperature two degrees and to maintain the reactor power heat-up rate within acceptable limits."

Another example is in the field of machinery diagnostics, where a machinery specialist is required to balance a forced draft fan from 76 μm (3 mils) pp to less than 24.5 μm (1 mil) pp. The standard may read, "the machinery diagnostics specialist is required to reduce fan vibration amplitude to less than 1 mil with no more than two machine start-ups and shutdowns." Another example would be the calibration of a vibration monitor. The standard may read, "the vibration technician must be able to check the calibration and proper operation of the vibration monitor, so it meets the specifications established by the original equipment manufacturer." In all three of these cases, an individual would have had to pass through three training steps before he is certified.

First, the task would be described and demonstrated by a person who is knowledgeable and competent. In the next step, guided practice, the employee performs the steps involved in the task while a supervisor or instructor praises and corrects as needed. The number of times the guided practice must be repeated varies with the complexity of the task. The employee is then ready to perform the activity by himself. After he proves he can perform the activity to the established standard, he can be certified. Certification training as well as refresher training must be documented.

What is driving today's programs?

Several things are driving today's certification programs. They are necessary to protect the public's health and welfare. For example, a doctor must be certified to meet established standards, to ensure that he does not adversely affect the health of his patients. A civil engineer must be certified, to ensure that the bridges he designs are safe for the public. The main reason plants are developing certification programs is to ensure that employees are competent to perform their assigned tasks. When you consider the hazards associated with many machine processes, the need for training in effective machinery monitoring and management is obvious.

Another reason is to meet OSHA 1910.119(g) requirements. These include maintaining records of each employee's training history, and certifying in writing that he has the knowledge, skill and ability to safely carry out the duties specified in the operating procedures. ISO 9000/9001 may also be driving the certification requirements. Paragraph 4.18 of ISO 9000/9001 Training states, "the supplier shall establish and maintain procedures for identifying the training needs and provide for the training of all personnel performing activities affecting quality. Personnel performing specific assigned tasks shall be qualified on a basis of appropriate education, training and/or experience." It is the company's duty to prove that employees and suppliers meet performance standards.

What does a program include?

A complete certification program begins by establishing standards of performance. Without standards, training modules cannot be developed or documented. Often, modules must be designed to meet specific requirements. Our customers often ask us to provide on-site training on certain types of machines or monitors. This tailor-made training helps them initiate and maintain certification. After the standards of performance for a particular job have been defined, an employee completes training modules to ensure he can meet them. If the training modules are not relevant to his duties, it would be difficult to certify that the employee can meet established standards. For example, I can teach someone how to balance a steam turbine; however, I will not cer-

tify he can balance steam turbines until I watch him do it correctly several times. The most significant parts of a certification program are to document the name of the employee, date and type of training, and how the employee proved that he understood the material or performed the task.

Passing an exam can prove an employee understands a subject. However, if the training involves a skill, the employee must demonstrate that he has the skill and ability to perform the task. For example, if he was taught how to calibrate a monitor, then the technician should show that he can. The performance is then documented.

Who can establish a program?

A certification program may be established by a plant to ensure that individual employees meet standards of performance outlined in specific job classifications. The main purpose of the program is to prevent an unqualified employee from adversely affecting people, the plant or the process. People are often under the misconception that a certification program must be sponsored by a governmental entity or other organized group. This is probably because state governments have established procedures to license engineers, doctors, lawyers and accountants, as assurance that the public is protected. In the field of vibration analysis and machinery management, no governmental organization has established standards of performance. They are the responsibility of each plant.

Bently Nevada can help you establish a vibration analysis and machinery management certification program at your facility.

Remember, the most important element is documentation to demonstrate that established standards have been met.

Our personnel will come to your facility, so we can understand the job descriptions and standards of performance you have developed. We will evaluate your employees' performance against your established standards, certify that they meet them or recommend and perform the training they need. ■

Differential Expansion

An essential measurement in a Turbine Supervisory System

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Turbine components that expand and contract with changes in temperature can result in rubs between rotating and stationary parts, for example, turbine blades and case, diaphragm or stationary blades. The thermal expansion is due to the high temperature steam as it is added to, and removed from, the turbine system. It is typically greatest during machine startup and shutdown. It is a problem because the turbine components expand and contract at different rates which results in a differential expansion.

The most critical differential expansion is between the rotor and the machine case, because it can result in damage to the blades, seals and diaphragms. During startups, as the turbine warms, the rotor expands faster than the case, causing a *Rotor Long* condition. During shutdowns, or when cooler or wet steam is in the steam path, the rotor cools and contracts faster than the case, causing a *Rotor Short* condition.

Because it is so critical, the differential expansion of the rotor relative to the case is an essential part of a Turbine Supervisory Instrumentation (TSI) System.

Specifying a differential expansion measurement

Differential expansion is typically measured at a point on the machine train where axial clearances are most critical. On many machines, it is measured at two or three different locations, usually at the ends of the machine opposite from where each turbine case is anchored (keyed to the foundation). These locations are typically some distance from the thrust bearing, which is used as a common reference point to maintain axial alignment between the machine's rotating and stationary components.

When retrofitting or upgrading a differential expansion system, certain machine information is required to help you select the correct monitor and transducer system:

- The determination of the differential expansion range.
  This information is typically derived from the actual machine clearance data (i.e. rotating-to-stationary blade clearance data). This information is necessary for selecting the proper transducer and the monitor range. Additional sources of this information include the Original Equipment Manufacturer (OEM) instruction manuals, existing differential expansion monitors and chart recorders, and historical machine clearance data.
- The number of locations where differential expansion will be monitored.
  For example: "The machine requires high-pressure turbine and low-pressure turbine differential expansion monitoring."
- The types and dimensions of the probe target areas.